FINAL SUBMITTAL

ENERGY SURVEY OF

ARMY INDUSTRIAL FACILITIES

ENERGY ENGINEERING ANALYSIS PROGRAM

LETTERKENNY ARMY DEPOT

CHAMBERSBURG, PENNSYLVANIA

EXECUTIVE SUMMARY

CONTRACT NO. DACA65-91-C-0071

PREPARED FOR:

U.S. ARMY CORPS OF ENGINEERS
NORFOLK, VIRGINIA

PREPARED BY:

REYNOLDS, SMITH AND HILLS, INC.
ENERGY AND ENVIRONMENTAL SERVICES DEPARTMENT
P.O. BOX 4850
JACKSONVILLE, FLORIDA 32201
904/279-2277

RS&H PROJECT NO. 2900379001

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DEPARTMENT OF THE ARMY
CONSTRUCTION ENGINEERING RESEARCH LABORATORIES, CORPS OF ENGINEERS
P.O. BOX 9005
CHAMPAIGN, ILLINOIS 61826-9005

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Marie Wakefield,
Librarian Engineering

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EXECUTIVE SUMMARY

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1.0 INTRODUCTION

1.1 Authorization

The Energy Engineering Analysis Program (EEAP), Energy Survey of Army Industrial Facility (ESAIF), Letterkenny Army Depot, Pennsylvania was authorized by the Department of the Army, Norfolk District Corps of Engineers, under Contract Number DACA65-91-C-0071. The objective of this study is to identify, evaluate and develop energy-saving projects which meet the criteria of the Department of the Army's many energy funding programs.

1.2 Report Organization

The report consists of an Executive Summary and four volumes. Volume I, the Narrative Report, contains the results of all of the site surveys, analysis and project development. All backup data and calculations are found in Volume II. The site survey notes are in Volume III, and project documentation forms necessary for receiving funding are in Volume IV.

2.0 INSTALLATION DESCRIPTION

Letterkenny Army Depot is located north of I-85 in South Central Pennsylvania, about five miles north of Chambersburg and eight miles southwest of Shippensburg. The facility was built in 1942 for ordnance storage and tank maintenance during World War II. The facilities at LEAD have evolved and improved but the basic mission is still supply, ammunition and maintenance. The ten directorates at LEAD which combine to perform this mission are:

- Maintenance
- Ammunition
- Supply
- Quality Assurance
- Resource Management
- Information Management
- Contracting
- Engineering and Logistics
- Personnel and Community Activities
- Law Enforcement and Security

The LEAD facilities cover over 20,000 acres of land and include about 980 buildings. The employment level as of September 1990 was 4,656. Figure 2-1 is a site plan of LEAD and shows the location of the various production facilities. The industrial areas (and Directorate) covered under the scope of work for this study include:

- Vehicle Maintenance (Maintenance)
- Electronic Systems Maintenance (Maintenance)
- Engine/Transmission Maintenance (Maintenance)
- Vehicle Care and Painting (Supply)
- Major Item Storage (Supply)
- Secondary Item Storage and Distribution (Supply)
- General Plant
  - Process Heating Systems
  - Space Heating Systems
  - Water Treatment Facilities

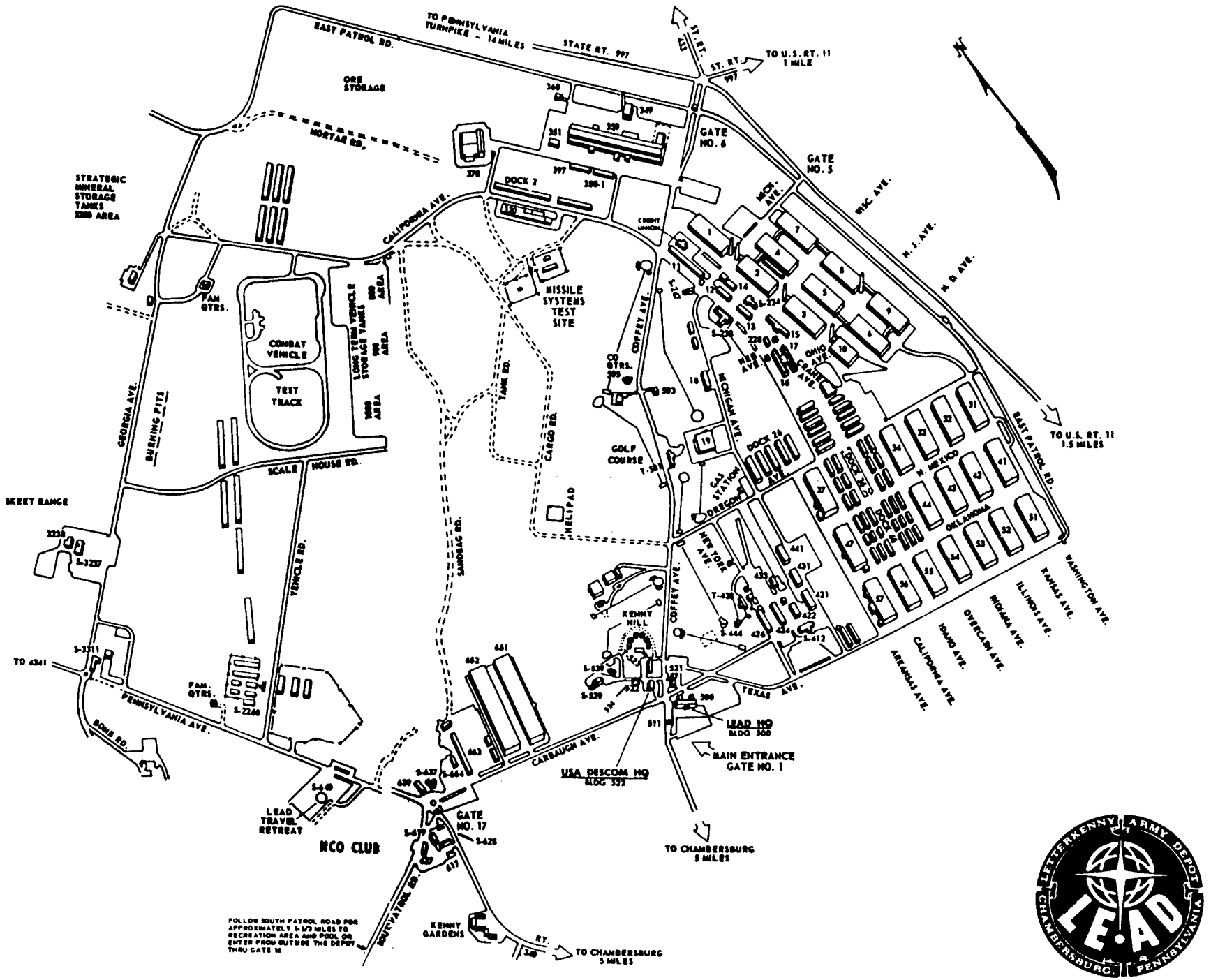

TO PENNSYLVANIA TURNPIKE - 14 MILES
EAST PATROL RD.
STATE RT. 997
ST. RT. 997
TO U.S. RT. 11 1 MILE
ORE STORAGE
MORTAR RD.
GATE NO. 6
GATE NO. 5
STRATEGIC MINERAL STORAGE TANKS 3200 AREA
CALIFORNIA AVE.
DOCK 2
MOV. AVE.
WAC AVE.
N.J. AVE.
K B AVE.
FAM QTRS.
COMBAT VEHICLE TEST TRACK
LONG TERM VEHICLE STORAGE TANKS
3000 AREA
900 AREA
MISSILE SYSTEMS TEST SITE
COPPEY AVE.
OHIO AVE.
MICHIGAN AVE.
GEORGIA AVE.
BURNING PITS
CARGO RD.
TANK RD.
GOLF COURSE
DOCK 26
TO U.S. RT. 11 1.5 MILES
EAST PATROL RD.
SCALE HOUSE RD.
GAS STATION
OREGON
HELIPAD
SKEET RANGE
VEHICLE RD.
SANDBAG RD.
NEW YORK AVE.
N. MEXICO
OKLAHOMA
WASHINGTON AVE.
KANSAS AVE.
ILLINOIS AVE.
INDIANA AVE.
OVERLOOK AVE.
IOWA AVE.
CALIFORNIA AVE.
ARKANSAS AVE.
KENNY HILL
TEXAS AVE.
TO 4341
PENNSYLVANIA AVE.
FAM. QTRS.
BOMB RD.
LEAD HQ BLDG 500
MAIN ENTRANCE GATE NO. 1
CARBAUGH AVE.
USA DESCOM HQ BLDG 322
LEAD TRAVEL RETREAT
NCO CLUB
GATE NO. 17
TO CHAMBERSBURG 5 MILES
SOUTH PATROL RD.
KENNY GARDENS
FOLLOW SOUTH PATROL ROAD FOR APPROXIMATELY 1-1/2 MILES TO RECREATION AREA AND POOL OR ENTER FROM OUTSIDE THE DEPOT THRU GATE 16
LETTERKENNY ARMY DEPOT
L·E·AD
CHAMBERSBURG PENNSYLVANIA

FIGURE 2-1

3.0 ENERGY CONSUMPTION

Total facility and production energy consumption at LEAD decreased by approximately 7.6 percent from FY 88 through FY 91 (Figure 3-1). The cause for the decrease was because of decreases in use of primary boiler fuels (FSR and FSD), which was related to weather. Electricity consumption, on the other hand, has remained relatively constant, showing a 2.5-percent increase over the same time period.

Monthly consumption of boiler fuels and electricity for FY 88-91 is shown in Figure 3-2. The strong dependence of boiler fuels on weather is readily apparent, although some steam is generated during the summer months for uses other than heating. Electricity use is fairly constant throughout the year, showing that almost all electricity consumption is strictly work related.

Percentages of fuel use for FY 90 are shown in Figure 3-3. The two primary boiler fuels accounted for approximately 63 percent of energy use in that year. However, energy costs by fuel type show a different picture (Figure 3-3a). The higher price paid for electricity causes it to represent the largest part of the annual LEAD utility bill at 61 percent. Also, due to the recent trend in decreasing energy prices, total annual energy costs at LEAD decreased by 18.3 percent from FY 88 through FY 91 (Figure 3-4).

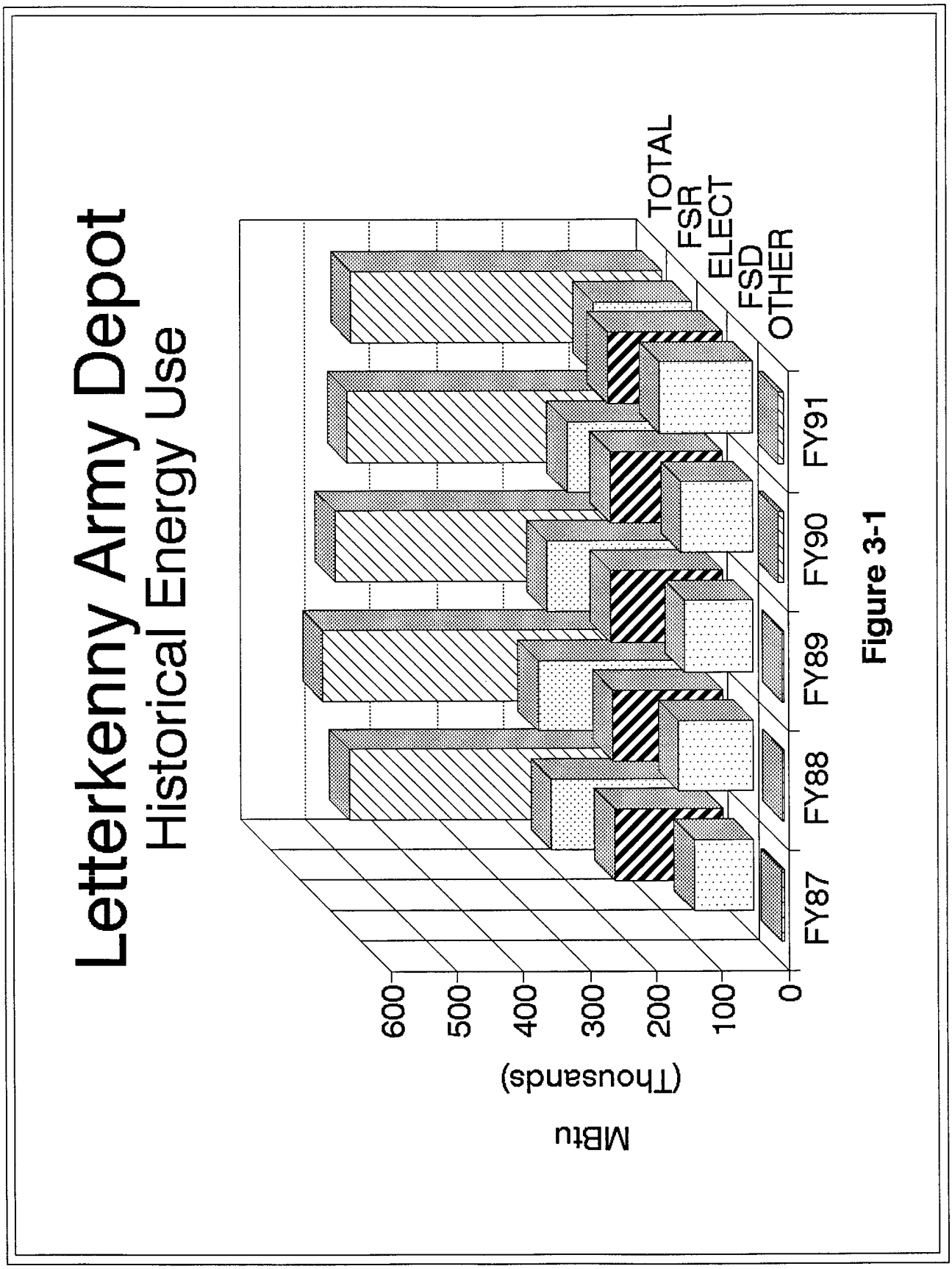

Letterkenny Army Depot
Historical Energy Use
MBtu
(Thousands)
600
500
400
300
200
100
0
FY87
FY88
FY89
FY90
FY91
TOTAL
FSR
ELECT
FSD
OTHER

Figure 3-1

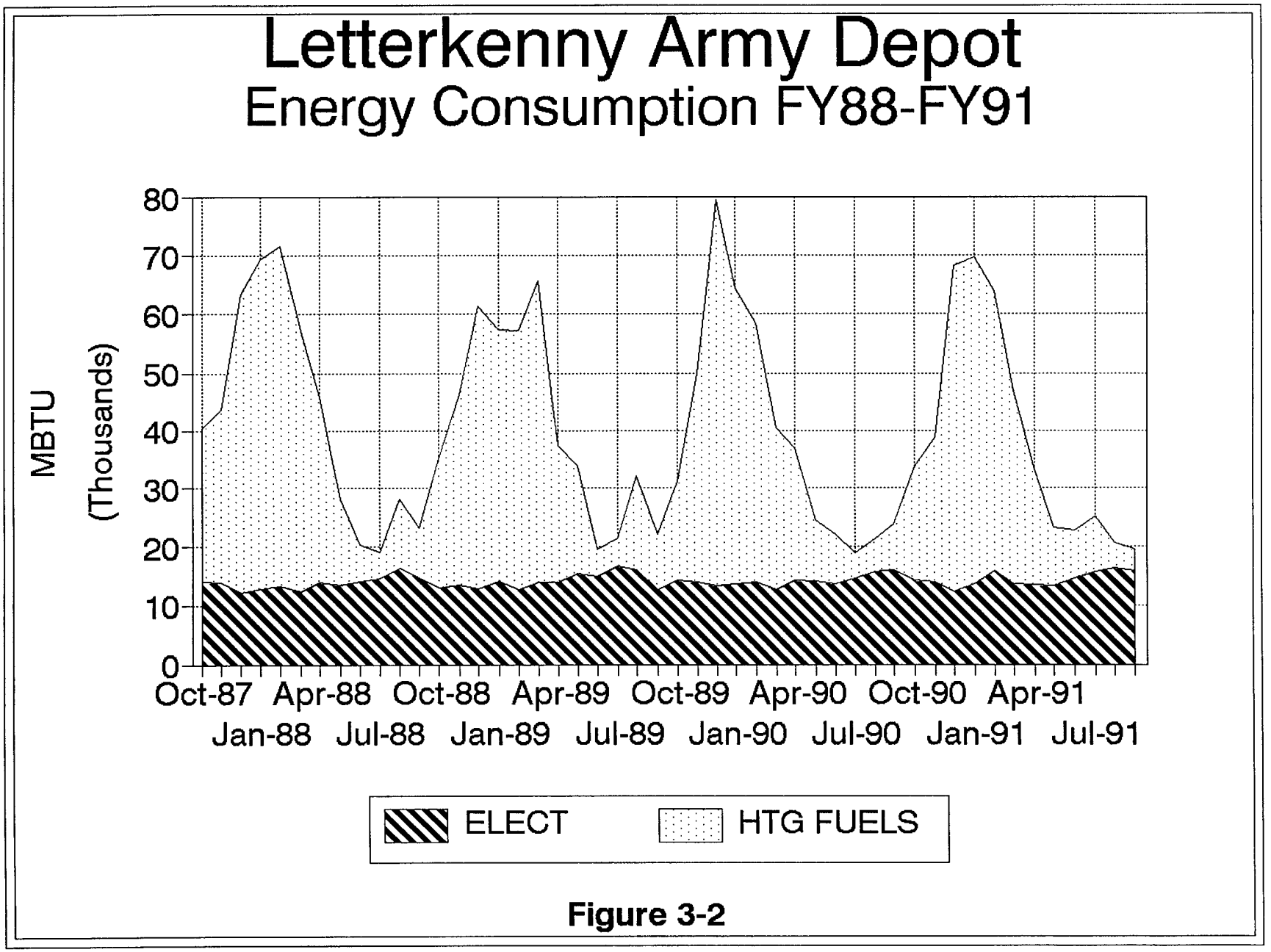
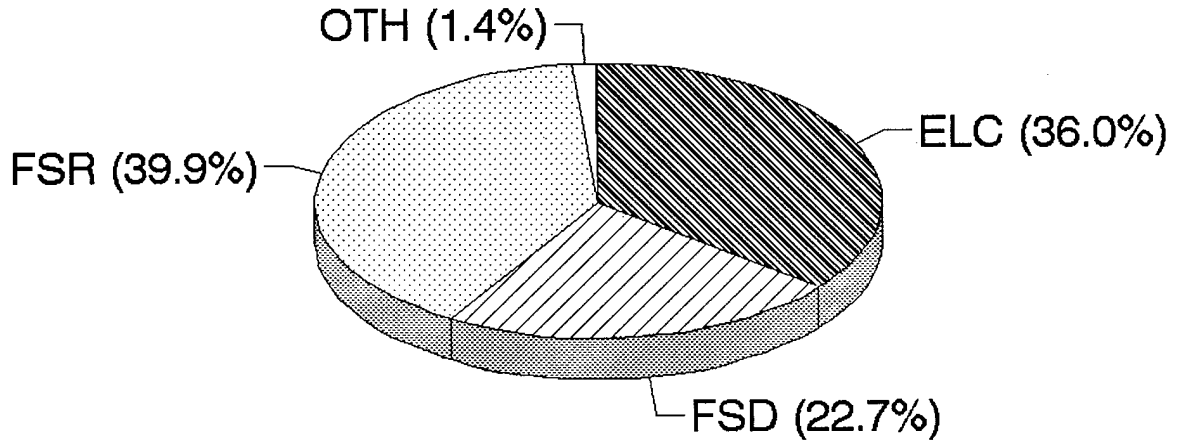

Letterkenny Army Depot
Energy Consumption FY88-FY91
MBTU
(Thousands)
80
70
60
50
40
30
20
10
0
Oct-87
Apr-88
Oct-88
Apr-89
Oct-89
Apr-90
Oct-90
Apr-91
Jan-88
Jul-88
Jan-89
Jul-89
Jan-90
Jul-90
Jan-91
Jul-91
ELECT
HTG FUELS

Figure 3-2

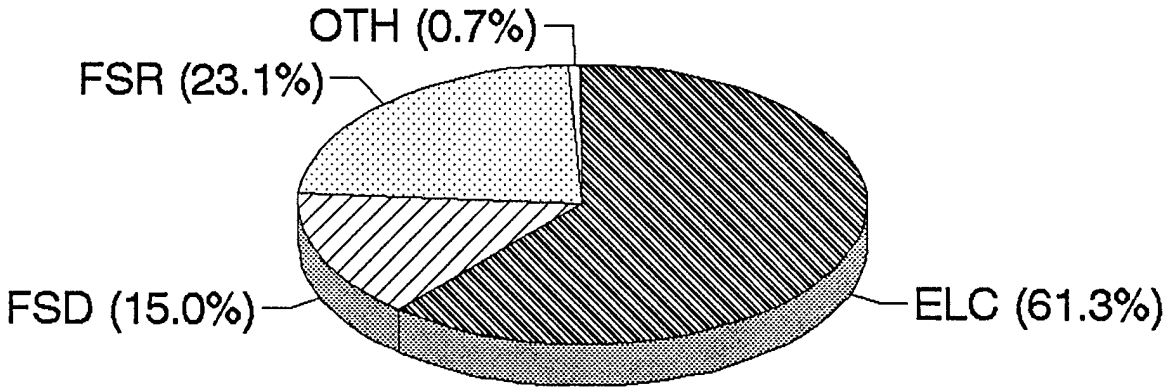
Letterkenny Army Depot
FY90 Facility Energy Use



Total Use = 472,493 MBtu

Figure 3-3

Letterkenny Army Depot
FY90 Facility Energy Cost



Total Cost = $2,895,000

Figure 3-3a

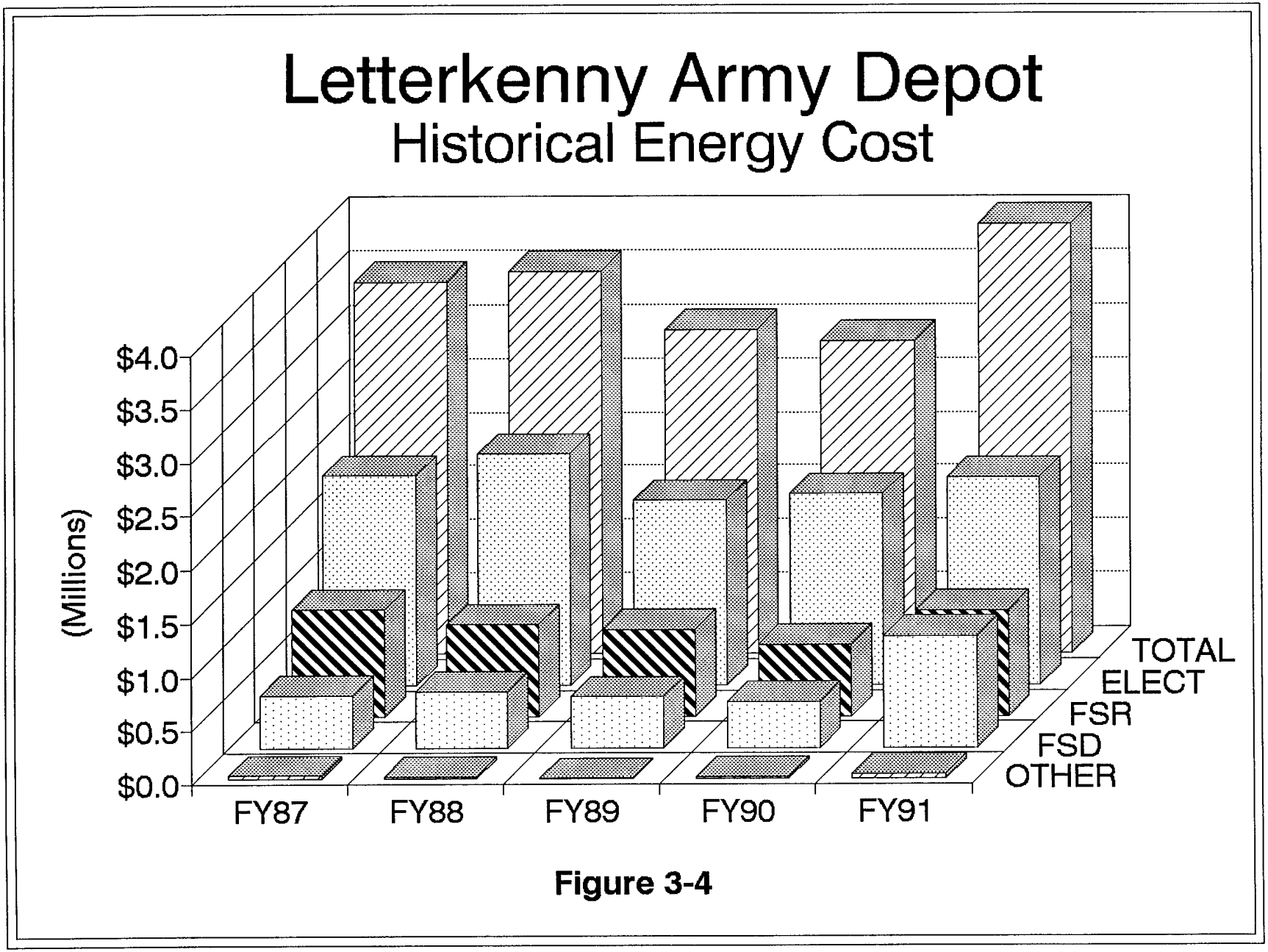

Letterkenny Army Depot
Historical Energy Cost
(Millions)
$4.0
$3.5
$3.0
$2.5
$2.0
$1.5
$1.0
$0.5
$0.0
FY87
FY88
FY89
FY90
FY91
TOTAL
ELECT
FSR
FSD
OTHER

Figure 3-4

4.0 ENERGY CONSERVATION ANALYSIS

4.1 Energy Conservation Opportunity (ECO) Evaluations

Each of the ECOs listed in the Scope of Work plus others were reviewed for their applicability and potential for significant energy savings and cost effectiveness for buildings representative of high energy consumption process areas at LEAD. The buildings actually surveyed vary slightly from the list in the scope of work, but the intent of the survey was accomplished--to survey and investigate energy savings in the major energy users in all active production areas. The results of this assessment are contained in tables in Volume II, Appendix B.

For each of the ECOs that were chosen to be evaluated, energy savings were calculated, cost estimates made and Life Cycle Cost Analyses performed. A summary of the results are contained in Tables 4-1 and 4-2. The evaluated ECOs are described and listed in Table 4-1. An alphabetical listing of evaluated ECOs along with a summary of the energy and cost savings analysis is shown in Table 4-2. Table 4-3 contains a listing prioritized by SIR. Table 4-4 contains a list prioritized by simple payback. Backup data and calculations are contained in Appendix B.

The ECO numbers are of the form ECO # or ECO X-UP where # represents a number and X represents a letter. The ECOs with letters designate an ECO that is being updated from a previous EEAP Study. The sequentially numbered ECOs are new ones.

4.2 Operations and Maintenance Energy Savings

4.2.1 Energy Savings Ideas. As a result of the site visit to LEAD, several operations and maintenance (O&M) energy savings ideas were identified. Energy and economic analyses were performed for these recommendations. Recommendations are listed below.

- Upon Failure, Replace Fluorescent Lamps with Energy-Efficient Types.

Table 4-1. ECOs Evaluated - Titles

No	ECO #	Description
1	1	Compressed air valve replacement in Building 350
2	2	Change "Steam" clean heating method in Bldgs. 349 & 351
3	3	Dip tank covers in Buildings 1, 37, 350 & 370
4	4	Heat recovery from paint booth exhaust air
5	5	EMCS in Building 370
6	6	Heat recovery from condensate in Building 349
7	7	No. 6 fuel oil recirculation control in Building 349
8	8	Reflectors for fluorescent fixtures in Buildings 5 & 370
9	9	Paint booth fan controls
10	10	Paint booth air flow control in Buildings 320 & 350
11	11	Blast booth fan cut off in Buildings 37 & 350
12	12	Boiler conversion to #5 fuel oil in Bldgs. 2, 8, 37 & 320
13	13	Energy efficient fluorescent lamps in Building 370
14	14	Energy efficient frequency converters in Building 370
15	15	Modular offices in Buildings 6-South, 8 & 9
16	16	Boiler conversion to natural gas in ten buildings
17	D-UP	Heat recovery from paint booths and engine test cells
18	E-UP	Vapor barrier for dehumidified warehouses
19	G-UP	Dip tank exhaust heat recovery in Building 350-North
20	H-UP	Baghouse insulation & exhaust air return in Bldgs. 37 & 35
21	I-UP	Large paint booth exhaust heat recovery in Building 350
22	J-UP	Medium paint booth exhaust heat recovery in Building 350
23	N-UP	Window & wall insulation in Bldgs. 422, 424, 426, 433 & 43
24	R-UP	High pressure sodium lighting in Bldgs. 31 - 34 & 41 - 44
25	G-E-UP	Paint booth exhaust heat recovery in Building 1
26	G-F-UP	Paint booth exhaust heat recovery in Building 14
27	G-G-UP	Paint booth exhaust heat recovery in Building 37
28	G-I-UP	Dip tank exhaust heat recovery in Building 350-South
29	G-J-UP	Main steam system expansion to Building 320
30	G-N-UP	Warehouse door seals in Buildings 2 and 4
31	G-P-UP	Strip curtains for warehouse doors in Building 2 and 4
32	G-U-UP	Storm windows in Building 3
33	G-V-UP	Loading dock door seals for Building 2

Table 4-2. ECO Evaluations - Results

No.	ECO #	Construction Cost Plus SIOH	Savings (Increase), MBtu/Year				Net Cost Savings	SIR	Simple Payback (Years)
			Elec	Dist	Resid	N Gas			
1	1	$7,671	366	-	-	-	$4,004	7.5	2.0
2	2	$15,985	-	-	-	-	-	-	-
3	3	$198,942	2,496	-	26,034	-	$137,400	10.0	1.5
4	4	-	-	-	-	-	-	-	-
5	5	$172,629	2,640	-	6,536	-	$57,700	4.3	3.2
6	6	$2,557	-	-	938	-	$4,100	38.6	0.7
7	7	-	-	-	-	-	-	-	-
8	8	$33,778	613	-	-	-	$6,711	2.8	5.3
9	9	$4,858	124	-	4,895	-	$22,900	71.0	0.2
10	10	$224,367	1,503	5,674	4,397	-	$64,100	3.8	3.7
11	11	$6,888	1,610	-	-	-	$17,613	26.0	0.4
12	12	$94,587	-	32,504	(32,504)	-	$26,653	-2.7	3.8
13	13	$19,400	153	-	-	-	$1,677	1.2	12.2
14	14	$147,457	567	-	-	-	$6,203	0.6	25.1
15	15	$24,637	(20)	2,775	-	-	$13,600	11.2	1.9
16	16	$2,415,158	-	36,513	226,569	(263,082)	$160,200	3.1	15.9
17	D-UP	$310,602	(750)	425	2,249	-	$9,819	1.0	33.4
18	E-UP	$799,693	5,937	-	-	-	$49,791	0.9	17.0
19	G-UP	$225,142	(107)	-	6,453	-	$27,300	2.9	8.7
20	H-UP	$132,659	-	-	2,988	-	$13,200	2.4	10.6
21	I-UP	$382,805	(1,111)	-	3,703	-	$12,322	1.1	32.8
22	J-UP	$382,804	(1,010)	-	3,644	-	$13,037	1.1	31.0
23	N-UP	$122,307	-	-	2,749	-	$13,700	2.3	9.4
24	R-UP	$287,199	465	-	-	-	$5,087	0.3	59.7
25	G-E-UP	$115,821	(141)	-	510	-	$1,829	0.5	67.0
26	G-F-UP	$93,779	(90)	-	325	-	$1,164	0.4	85.2
27	G-G-UP	$115,821	(109)	-	393	-	$1,405	0.4	87.1
28	G-I-UP	$40,123	(78)	-	338	-	$1,381	1.0	30.7
29	G-J-UP	$1,065,732	-	8,780	8,780	-	$7,200	0.0	147.4
30	G-N-UP	$51,320	-	900	1,982	-	$6,300	4.0	8.6
31	G-P-UP	$31,981	-	598	508	-	$611	2.2	55.3
32	G-U-UP	$29,144	-	-	255	-	$1,176	1.0	26.2
33	G-V-UP	$27,282	-	-	345	-	$1,500	1.3	19.0

Table 4-3. ECO Evaluations - Results Prioritized by SIR

No.	ECO #	Construction Cost Plus SIOH	Savings (Increase), MBtu/Year Elec	Dist	Resid	N Gas	Net Cost Savings	SIR	Simple Payback (Years)
1	9	$4,858	124	-	4,895	-	$22,900	71.0	0.2
2	6	$2,557	-	-	938	-	$4,100	38.6	0.7
3	11	$6,888	1,610	-	-	-	$17,613	26.0	0.4
4	15	$24,637	(20)	2,775	-	-	$13,600	11.2	1.9
5	3	$198,942	2,496	-	26,034	-	$137,400	10.0	1.5
6	1	$7,671	366	-	-	-	$4,004	7.5	2.0
7	5	$172,629	2,640	-	6,536	-	$57,700	4.3	3.2
8	G-N-UP	$51,320	-	900	1,982	-	$6,300	4.0	8.6
9	10	$224,367	1,503	5,674	4,397	-	$64,100	3.8	3.7
10	16	$2,415,158	-	36,513	226,569	(263,082)	$160,200	3.1	15.9
11	G-UP	$225,142	(107)	-	6,453	-	$27,300	2.9	8.7
12	8	$33,778	613	-	-	-	$6,711	2.8	5.3
13	H-UP	$132,659	-	-	2,988	-	$13,200	2.4	10.6
14	N-UP	$122,307	-	-	2,749	-	$13,700	2.3	9.4
15	G-P-UP	$31,981	-	598	508	-	$611	2.2	55.3
16	G-V-UP	$27,282	-	-	345	-	$1,500	1.3	19.0
17	13	$19,400	153	-	-	-	$1,677	1.2	12.2
18	I-UP	$382,805	(1,111)	-	3,703	-	$12,322	1.1	32.8
19	J-UP	$382,804	(1,010)	-	3,644	-	$13,037	1.1	31.0
20	D-UP	$310,602	(750)	425	2,249	-	$9,819	1.0	33.4
21	G-I-UP	$40,123	(78)	-	338	-	$1,381	1.0	30.7
22	G-U-UP	$29,144	-	-	255	-	$1,176	1.0	26.2
23	E-UP	$799,693	5,937	-	-	-	$49,791	0.9	17.0
24	14	$147,457	567	-	-	-	$6,203	0.6	25.1
25	G-E-UP	$115,821	(141)	-	510	-	$1,829	0.5	67.0
26	G-F-UP	$93,779	(90)	-	325	-	$1,164	0.4	85.2
27	G-G-UP	$115,821	(109)	-	393	-	$1,405	0.4	87.1
28	R-UP	$287,199	465	-	-	-	$5,087	0.3	59.7
29	G-J-UP	$1,065,732	-	8,780	8,780	-	$7,200	0.0	147.4
30	12	$94,587	-	32,504	(32,504)	-	$26,653	-2.7	3.8
31	2	$15,985	-	-	-	-	-	-	-
32	7	-	-	-	-	-	-	-	-
33	4	-	-	-	-	-	-	-	-

Table 4-4. ECO Evaluations - Results Prioritized by Simple Payback

No.	ECO #	Construction Cost Plus SIOH	Savings (Increase), MBtu/Year				Net Cost Savings	SIR	Simple Payback (Years)
			Elec	Dist	Resid	N Gas			
1	9	$4,858	124	-	4,895	-	$22,900	71.0	0.2
2	11	$6,888	1,610	-	-	-	$17,613	26.0	0.4
3	6	$2,557	-	-	938	-	$4,100	38.6	0.7
4	3	$198,942	2,496	-	26,034	-	$137,400	10.0	1.5
5	15	$24,637	(20)	2,775	-	-	$13,600	11.2	1.9
6	1	$7,671	366	-	-	-	$4,004	7.5	2.0
7	5	$172,629	2,640	-	6,536	-	$57,700	4.3	3.2
8	10	$224,367	1,503	5,674	4,397	-	$64,100	3.8	3.7
9	12	$94,587	-	32,504	(32,504)	-	$26,653	-2.7	3.8
10	8	$33,778	613	-	-	-	$6,711	2.8	5.3
11	G-N-UP	$51,320	-	900	1,982	-	$6,300	4.0	8.6
12	G-UP	$225,142	(107)	-	6,453	-	$27,300	2.9	8.7
13	N-UP	$122,307	-	-	2,749	-	$13,700	2.3	9.4
14	H-UP	$132,659	-	-	2,988	-	$13,200	2.4	10.6
15	13	$19,400	153	-	-	-	$1,677	1.2	12.2
16	16	$2,415,158	-	36,513	226,569	(263,082)	$160,200	3.1	15.9
17	E-UP	$799,693	5,937	-	-	-	$49,791	0.9	17.0
18	G-V-UP	$27,282	-	-	345	-	$1,500	1.3	19.0
19	14	$147,457	567	-	-	-	$6,203	0.6	25.1
20	G-U-UP	$29,144	-	-	255	-	$1,176	1.0	26.2
21	G-I-UP	$40,123	(78)	-	338	-	$1,381	1.0	30.7
22	J-UP	$382,804	(1,010)	-	3,644	-	$13,037	1.1	31.0
23	I-UP	$382,805	(1,111)	-	3,703	-	$12,322	1.1	32.8
24	D-UP	$310,602	(750)	425	2,249	-	$9,819	1.0	33.4
25	G-P-UP	$31,981	-	598	508	-	$611	2.2	55.3
26	R-UP	$287,199	465	-	-	-	$5,087	0.3	59.7
27	G-E-UP	$115,821	(141)	-	510	-	$1,829	0.5	67.0
28	G-F-UP	$93,779	(90)	-	325	-	$1,164	0.4	85.2
29	G-G-UP	$115,821	(109)	-	393	-	$1,405	0.4	87.1
30	G-J-UP	$1,065,732	-	8,780	8,780	-	$7,200	0.0	147.4
31	4	-	-	-	-	-	-	-	-
32	7	-	-	-	-	-	-	-	-
33	2	$15,985	-	-	-	-	-	-	-

- o Upon Failure, Replace Standard Fluorescent Fixture Ballasts with Energy-Efficient Types.
- o Reduce Auxiliary Steam Use in Building 349.
- o Purchase and Use a Portable Flue Gas Analyzer.
- o Implement Various Recommendations for Paint Booths.
- o Turn Off Bleeds on Compressed Air Filters

4.3 Low Cost/No Cost ECOs

During the site survey, several low cost/no cost energy conservation opportunities were found. These were grouped by project type and evaluated for cost effectiveness. Each is analyzed separately and the results are contained in Table 4-5. Detailed calculations can be found in Volume II, Appendix B.

Below are the low cost/no cost projects evaluated.

LCNC 1: Close Warehouse Doors When Not in Use
LCNC 2: Turn Off Unneeded Lights
LCNC 3: Insulate Steam Pipes
LCNC 4: Turn Off Equipment When Not in Use
LCNC 5: Repair Strip Curtains at Conveyor Entrance
LCNC 6: Install Motion Sensor Lighting Controls
LCNC 7: Repair Steam Leaks
LCNC 8: Repair Compressed Air Leaks
LCNC 9: Delamp in Overlighted Areas

Table 4-5. Low Cost/No Cost Projects

Number	Cost	Energy Savings (MBtu/yr) Fuel Oil #2	Fuel Oil #5/6	Electricity	Energy Cost Savings ($/yr)
LCNC 1	0	172	0	0	$817
LCNC 2	0	0	0	172	$1,874
LCNC 3	$6,946	1,567	-	0	$7,804
LCNC 4	0	0	0	923	$10,087
LCNC 5	$4	543	-	0	$2,704
LCNC 6	$668	0	0	96	$1,043
LCNC 7	$2,164	-	936	0	$4,314
LCNC 8	$5,367	0	0	1,100	$11,750
LCNC 9	$536	0	0	45	$749
TOTALS	$15,685	2,282	936	2,336	$41,142
		3,218			

5.0 ENERGY PLAN

5.1 Project Package

The ECOs listed in Table 4-2 were evaluated for appropriate funding category. The project scope of work listed the following guidelines on this subject.

	Project Cost	Simple Payback
QRIP	$5,000-$100,000	≤ 2 yrs.
OSD PIF	> $100,000	≤ 4 yrs.
PECIP	> $100,000	≤ 4 yrs.
ECIP	> $200,000	≤ 10 yrs., SIR > 1.0
MCA	> $200,000	≤ 25 yrs., ≥ 8 yrs.

Table 5-1 contains the results of the analysis and lists the ECOs by project funding category.

5.2 Energy and Cost Savings

Energy and cost savings for the recommended project funding are listed in Table 5-2. Project capital costs are escalated at 4 percent per year according to the project implementation schedule as discussed below. Energy costs are presented in constant dollars, using FY 92 prices. Projects #5, EMCS for Building 370 and #16, Boiler Conversion to Natural Gas have been programmed by LEAD into the ECIP program. The implementation of all projects yield a total annual energy savings of 53,400 MBtu and annual cost savings equal to $475,300. Low cost/no cost projects yield another 5,500 MBtu and $40,000 annual energy and cost savings, respectively. This totals to 58,900 MBtu and $515,300 annual savings, which represents reductions of 12 percent and 18 percent, respectively when compared to FY 90 values. Figures 5-1 and 5-2 show energy use and cost, respectively, at LEAD before and after implementation of these projects.

5.3 Project Schedule

Project implementation dates are estimated as follows:

QRIP, OSD PIF	FY 93
ECIP, MCA	FY 95

Following this schedule, Figures 5-3 and 5-4 were developed to show the impact implementation the recommended projects would have on energy use and cost, respectively, at LEAD.

Table 5-1. Project Funding List

Funds	ECO ID	Project Description
QRIP	1	Compressed air valve replacement (Building 350)
	6	Heat recovery from condensate (Building 350)
	9	Paint booth fan controls (Buildings 37, 350 and 370)
	11	Blast booth fan cut off (Buildings 37 and 350)
	15	Modular offices (Buildings 6S, 8, 9)
OSD PIF	3	Dip tank covers (Buildings 1, 37, 350, 370)
	10	Paint booth air flow control (Buildings 320, 350)
ECIP (1)	16	Boiler conversion to natural gas (Building 349)
	5	EMCS in Building 370

(1) Submitted by LEAD as ECIPs.

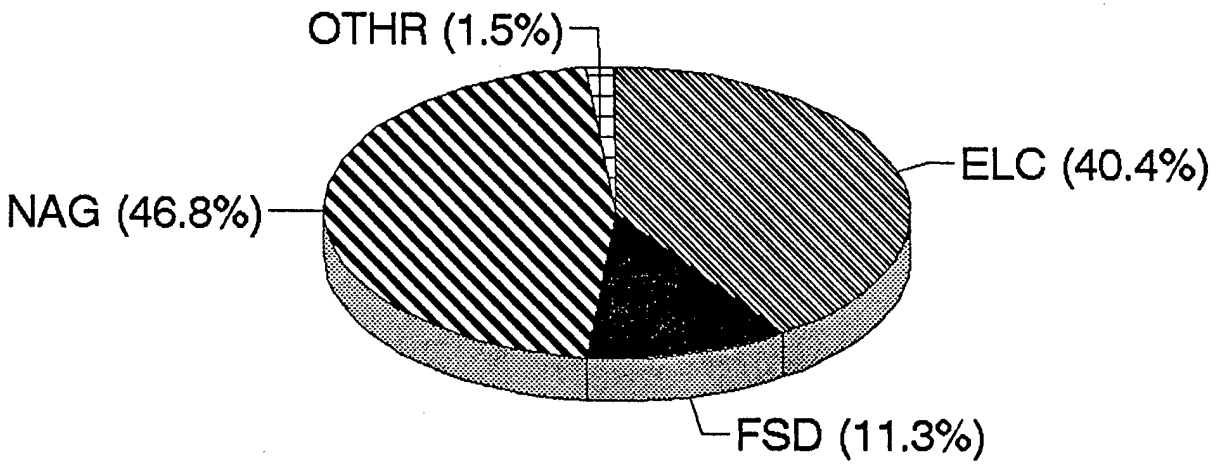
Table 5-2. Project Energy and Cost Savings

No.	Project #	ECO Names	Construction Cost Plus SIOH(1)	Annual Energy Savings MBtu	Annual Energy Savings $(2)	Project Funding	Project Year
1	9	Paint booth fan control	$5,254	5,019	$22,900	QRIP	93
2	11	Blast booth fan cut off	$7,450	1,610	$17,613	QRIP	93
3	6	Heat recovery from condensate	$2,766	938	$4,100	QRIP	93
4	3	Dip tank covers with exhaust fan controls	$214,857	28,530	$137,400	OSD PIF	93
5	15	Modular offices	$26,608	2,755	$13,600	QRIP	93
6	1	Compressed air valve replacement	$8,285	366	$4,004	QRIP	93
7	5	EMCS in Building 370	$194,184	9,176	$57,700	ECIP	95
8	10	Paint booth air flow control	$242,367	11,574	$64,100	OSD PIF	93
9	16	Boiler conversion to natural gas	$2,704,976	0	$160,200	ECIP	95
TOTALS			$3,406,747	53,400 (3)	$475,300 (3)		

(1) Escalated to year of implementation.
(2) Energy costs are in constant FY92 dollars.
(3) Total does not equal to column sum due to project synergism effects.

Letterkenny Army Depot

Energy Use After Project Implementation



Total Use = 413,400 MBtu

Does not include mobility fuels.

Figure 5-1

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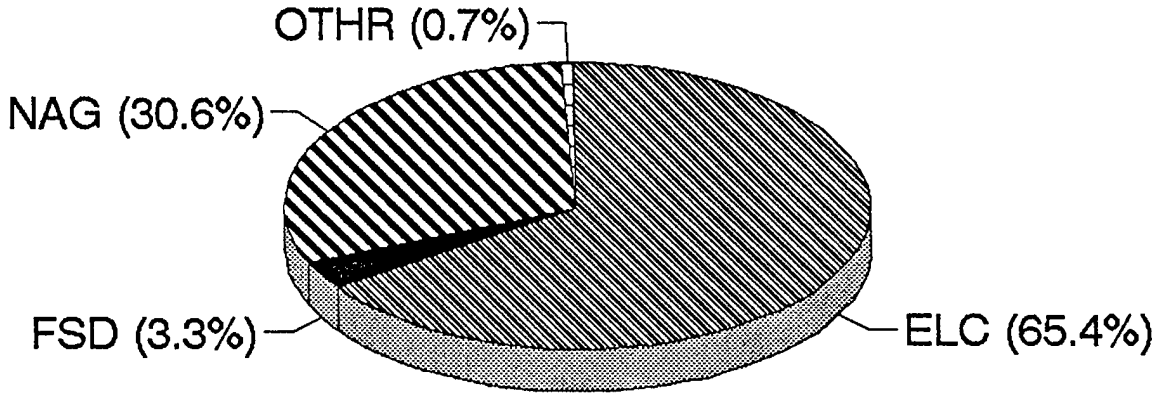
Energy Cost after Proj. Implementation



Total Use = $ 2,800,000

Does not include mobility fuels.

Figure 5-2

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Effects of Project Implementation

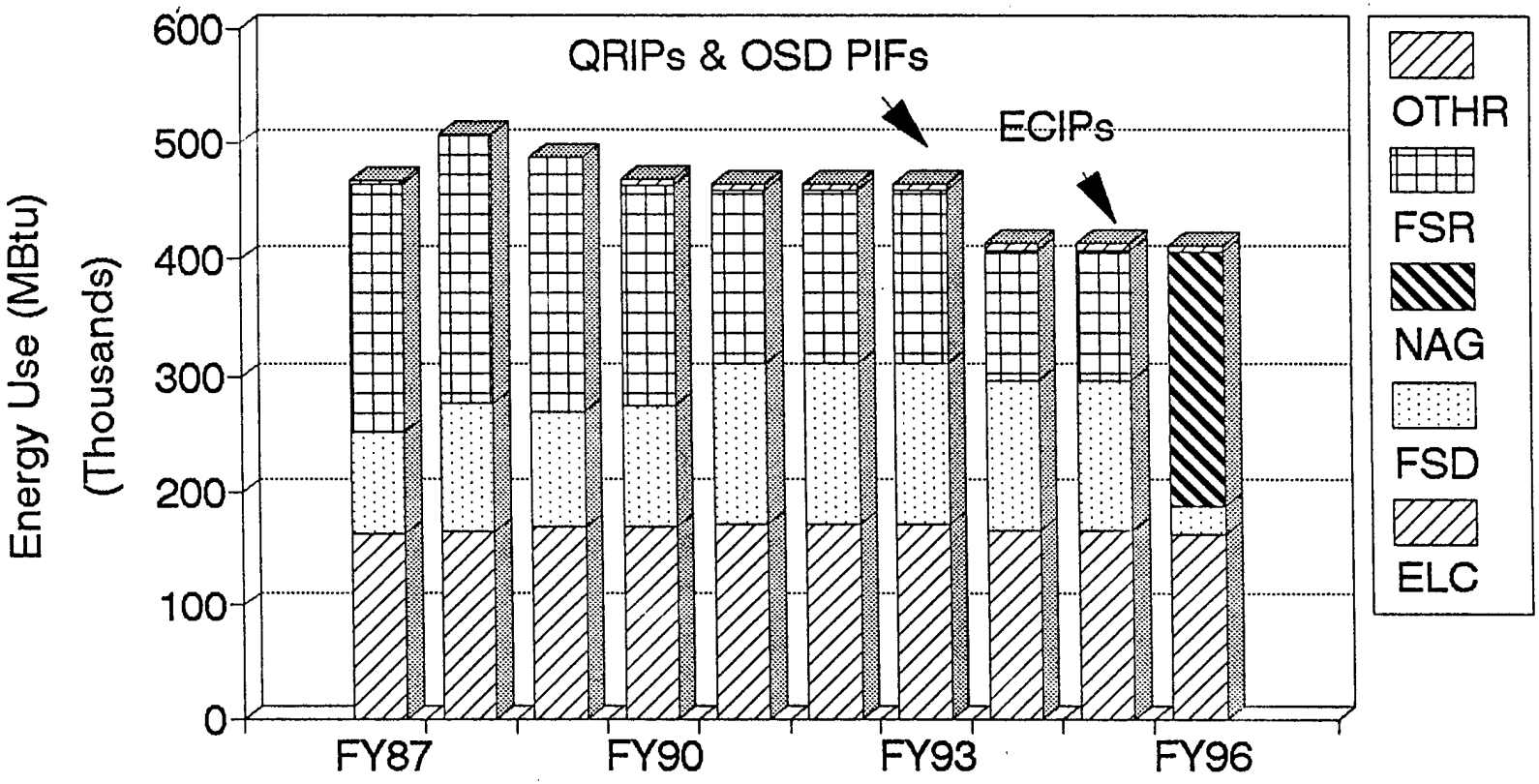

Figure 5-3

Letterkenny Army Depot
Effects of Project Implementation

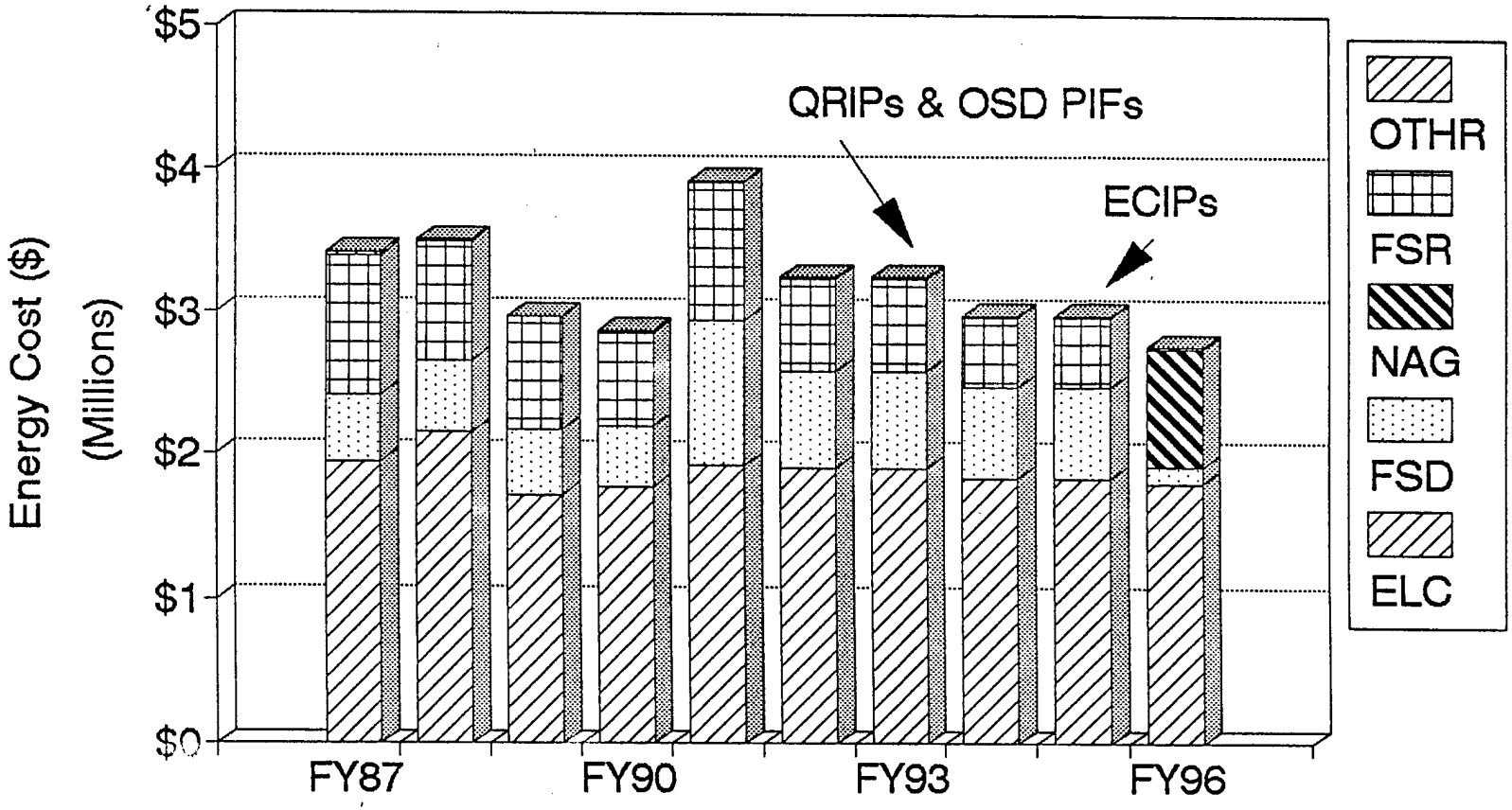

Figure 5-4